TRUE GRITS

Volume 3, Issue 4 — Region 4's Geographic Resources and Information Technology Services Team — Winter 1999/2000

IN THIS ISSUE...

How To Reach Us

Tel.: 404-562-8011
Rock G. Taber
Editor, *True Grits*

Phyllis Mann – Assoc. Editor
Mary Spivey – Assoc. Editor
Cydrena Harris - Layout

Environmental Protection Agency
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, GA 30303-8960 USA
taber.rock@epa.gov

WELCOME!

Welcome to our winter issue, where we are working hard to bring you news that is both timely and informative. In this edition, we are showcasing several GIS projects in the Region as well as providing some useful technical tips for the Arcview user. Also presented are some of the latest developments in the GIS industry, new web sites, and the big news about the IKONOS 1-meter satellite. Enjoy and have a happy and safe holiday!

Happy GIS Day!

As you may know, November 17 was National GIS Day–hope you celebrated. GIS is finally coming into its own after four decades of development. Actually, the beginnings of geographic technology date back into the 1700's with the development of cartographic and the first accurate base maps. In our lifetimes (at least some of our lifetimes), we have seen two events that lead to the rapid evolution of GIS technology as we know it today. One was the advent of computers in the 1960's and the concern about the environment beginning in the 1970's. Although Ian McHarg's book *"Design with Nature "* published in the early 1970's presented map overlay techniques and earned Ian McHarg the title , "Father of GIS", many aspects of modern GIS were pioneered in the early 1960's with the development of Canada Geographic Information.

The most growth of GIS has certainly taken place within the last ten years. Looking at publications as an indicator: *Books in Print* listed only two GIS books before 1985. Between 1985 and 1990, 40 books appeared. At the end of 1998, 259 books were listed. Articles on GIS first appeared in the scientific articles database in 1977. Between then and 1989, 191 articles were published, but since 1990, more than 3,000 articles have been published.

By the way, if money is a mark of success, then GIS has definitely arrived. The GIS software market is nearly a billion dollars a year.

As we enter a new century, I believe that GIS and all spatial analysis will continue to grow as decision aiding tools. But, to me, the ultimate success will be when people use it without even knowing that what they are using is called GIS. *Rebecca Kemp – Chief, GIS & Info. Resources Section, Info. Mgmt. Br.*

SPOTLIGHT -

Using Arcview 3D Analyst to Determine Excavation Volume

3D Analysis Determines Excavation Volume at existing cap area of Woolfolk Chemical Works site, Fort Valley, GA –

Jonathan Vail, Science and Ecosystem Services Division – Athens, GA

In order to assess the analytical data obtained from the investigation of the existing cap area at the Woolfolk Chemical Works Superfund site, the GIS software Arcview® with the extension 3D Analyst was utilized. This software gave the capabilities of contouring, TIN generation, but more importantly the ability of building multiple depth point coverages.

Before starting a 3D project, create a "project" directory and a "temp" directory within the "project" directory. Open Arcview®, add the 3d Analyst extension and in *Project, Properties*, set the *home directory* to a temp directory that was made in the project directory (i.e., C:\Woolfolk\Temp\). This is where all the contouring, tin and other files will go automatically. If this is not done, your Windows\Temp directory gets all cluttered up with these files and you may, at latter time, accidentally delete some files necessary for your 3D project. Also, keep in mind the map units that are being used. I chose to use UTM meters as the coordinate system and put the depths in meters also, so the units would not be in conflict.

Background and History

The entire Woolfolk Chemical Works Site encompasses over 20 acres in Fort Valley, Georgia. Various chemical production facilities were situated across the site since earlier this century. The portion of the site to be investigated, the existing cap area, is approximately 1 acre in size and was the location of a lead-arsenate production building, an arsenic storage building, railroad track, smaller process related buildings and a portion of a lime sulfur sludge pile. Currently the existing cap area is a site contaminant landfill that is now a grassy area elevated approximately 5 feet above the surrounding terrain and is fenced off from public access and exposure. The landfill has documented concentrations of arsenic, lead, and other contaminants that were placed in the ground temporarily, and must be now be removed to protect human health and the environment. The objective of the investigation was to obtain additional information for a better estimate of the volume of material which must be excavated from the old landfill cap area, based on the action level or soil cleanup goals according to the Record of Decision (ROD) for the site.

Building Multiple Depth Point Coverages

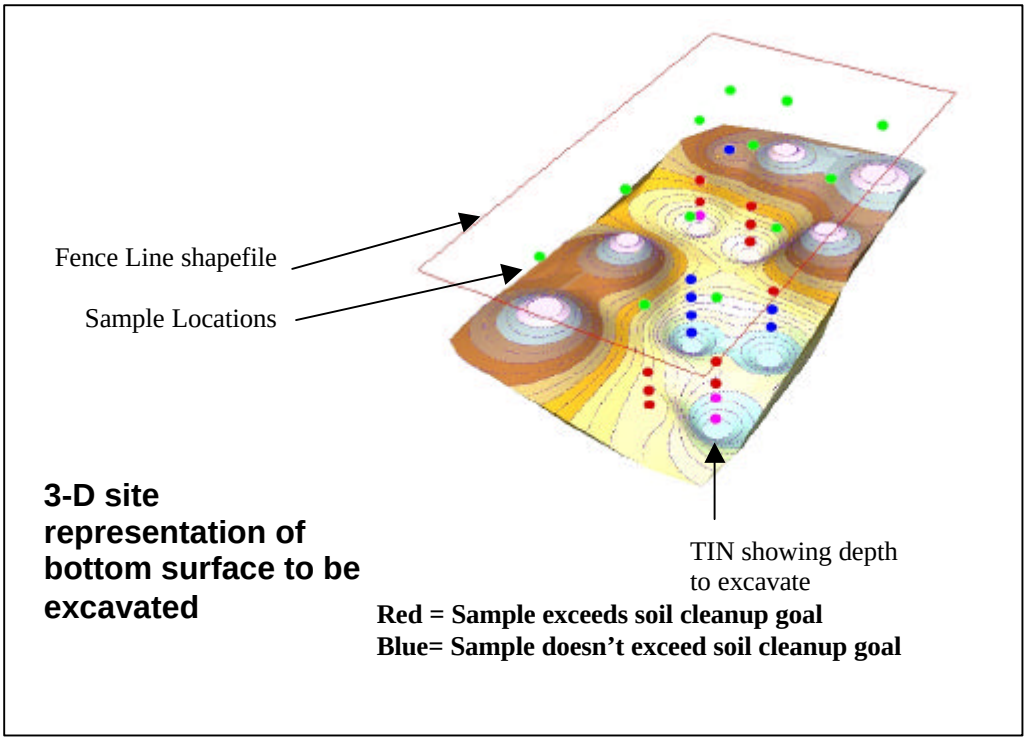
The first step in determining the volume of material that must be removed from this parcel of land was to identify the contaminants that exceeded the soil cleanup goals that were set forth in the ROD for the site. Complete full scan analytical results of soil samples from five depths at ten locations and three depths at two locations (56 samples) were obtained to determine to contents of the landfill. Four contaminants were found to exceed the soil cleanup goals at various locations and at various depths across the site. Using data directly from SESDs laboratory information system database (note, the amount column must be changed from the default of text, due to SESDs need for exponential notion, to numeric), the *query* function is used to identify only those contaminants that meet the cleanup goal criteria stated above. Once this is known, smaller analytical data table(s) (dbf format) was created which had the Station_Id, Depth_m (note units are meters and depth is negative), Contaminant, Amount, and Units. This was done for each contaminant that exceeded the soil cleanup goals.

The GPS data collection file(s) of the sample locations is converted to a coverage and the X and Y coordinates are added to the attributes of station location table (i.e., *Calculate* shape.getx, etc.). With only the Station_Id, X, and Y theme properties showing, *Join* the attributes table with the dbf analytical data table. Next in *View*, add this file as an *Event Theme*, with X and Y set as X and Y. In *Theme*, with this theme highlighted or selected, *Convert to shape file* (must be a different name than dbf file), open *3D Scene* and add shape file as a *Theme*. Change the symbol size as appropriate and classify the symbol according to the soil cleanup goals. For my example, those that exceeded soil cleanup goals are red and those that don't are blue (hot and cold). While in 3D Scene, select *Theme, 3D properties*, and set *Assign base heights by value or expression* to [Depth_m]. This will push the multiple depth point coverage to the assigned depth of the individual analytical results. The steps detailed in the two paragraphs above should be performed for each of the contaminants in question.

Contouring

Now, points that are red exceed the soil cleanup goal and those that are blue don't. Since we want to know the amount of material that must be excavated (how deep), only the maximum depth at each of the locations that exceed any of the individual contaminants soil cleanup goals is pertinent. So a table must be made showing the twelve stations (Station_Id), and the single depth (Depth_m), at each location, that must be excavated down to, based on a particular contaminant being found above the soil cleanup goals. This is done in Arcview® by opening the analytical dbf table above and striping out all unnecessary columns and/or rows, then exporting as a dbf file and saving under a different name. Next select, *Theme*, *Convert to a shape file*, then *Surface*, and *Create contours*. While in the contouring screen, select the site boundary (in this case the fence line shape file) so the contours stop and do not continue too far past the data point. Once this is contoured, add this to the *3D Scene* and set *Assign base heights by value or expression* to [contours] so the contours bound the bottom extent that must be excavated.

Determining Volume
While in *3D Scene*, select or highlight the contours theme and select *Surface*, and *Create TIN from Features*. Select *Height Source*: contour, *Input as*: Soft Breaklines, with *Value Field*: <none>. This basically colors the contours the same color between contour lines. Edit the TIN theme properties as appropriate: don't show *Lines*, change *Label* or *Legend* name in *Faces* to the identified property you are trying to show, and select the appropriate symbol *Color Ramp*, with the pertinent *Value* and *Label* for clarity. The volume of material either above or below the highlighted TIN can now be determined by selecting *Surface* and then *Area and Volume Statistics*. With this done, understand that the volume units are cubic meters and can be converted to the common volume units of cubic yards by multiplying by 1.308.



TECHNICAL CORNER

ARCVIEW Tip: Editing Large Dbf Files.- John Richardson, Planning Analysis Branch, OPM

Recently I was editing a large DBF in as an Arcview table (about 850 mb). After adding a couple of fields and calculating values for the fields, I told Arcview to stop editing and save the edits. It crunched on this for an hour or so and finished updating the file. Much to my horror, when I was looking at the file (Road shapefile with 5,880,000 records), I discovered that much of the table had either been overwritten with 0's in numeric fields that used to have data or incorrect data in string variable fields! Luckily I had a back-up and was able to go back to it.

What I discovered was that the TEMP space (in this case C:\temp\) ran out of room and AV went on doing what it was doing writing out the new file with no error messages, resulting in a corrupt output file.
When AV is editing a table, several files are generated, Delta1.dbf, Delta1.rcm and Delta1.log. These are apparently keeping track of the edits as a joined file to the original. When the stop and save operation occurs a new file called Temp1.dbf is written (in the TEMP space) and then this is copied over the original dbf file. All of the delta and temp files are saved in the TEMP space therefore requiring about 2x the original file size to do the edits.

Arc/Info License Changes - *Henry Strickland, Information Management Branch, OPM*

Many of you know that we have frequently had difficulty delivering consistent, reliable Arc/Info license service with our legacy system and network configurations. Some of you are aware of our efforts on behalf of EPA Region 4 to improve this situation. I am pleased to report that (we believe) we have resolved these issues.

At the beginning of programmatic GIS support in Region 4, the Office of Integrated Environmental Analysis (now the GRITS team) provided user organizations with procurement specifications, and with installation and configuration of GIS software on dedicated workstations. This model guaranteed that the purchaser of a license had exclusive use of that license, and insured that, as long as your workstation was operable, your license was, or could be made, available to any single user of your workstation. The availability of a dedicate license is an obvious strength of this system, because of the built-in independence and autonomy of free-standing workstation, however, EPA management quickly realized the need for centralized data support, as well as the flexibility inherent in the operation of a GIS workstation, and just as quickly, the strength of a dedicated license became a weakness. As workstations became networked with data servers, as well as with other workstations and X-terminals, demands became more prevalent for sharing the GIS license resource, both within individual program offices and between users all over the Region.

The first attempt to address this problem was migration of most licenses to central servers, which enabled a "pool" of licenses to be shared among users at large. This system was adopted during the early 1990's, and remained in force up until the beginning of November, 1999. The biggest problem with this system was that, since individual workstations no longer performed autonomous license service, failure of the license server would halt GIS work for many people, instead of the single workstation user. As the installed base of computers, and thus the license servers, aged, such failures became more frequent and lasted longer, and it became obvious that a more reliable system for delivery of license service was required.

Today, as a result of frequent and prolonged negotiations with ESRI, the source of our GIS software, we have migrated all but one of the existing Arc/Info licenses to a new configuration, using multiple/redundant servers. Under this system, there are three separate machines providing license service, each using the same license configuration file. Any single machine can fail without interrupting license service, as long as at least two of the servers continue operating. Migration to this system has not been free of problems, but as of November 9, 1999 migration is complete, and it appears that all license clients have successfully connected. License service should be available 24/7, except for the period 5:00-6:00 AM, each Monday, when all servers see a boot cycle.

ON THE WEB

Region 4 Internet site
Check out the Regions newly redesigned website at www.epa.gov/region4/index.html .
You'll also find a copy of this Newsletter there in both Adobe® PDF format and hypertext format.

GIS on the Web
There are many interesting and useful GIS Web sites on the internet now, with more being added every day. With the "net" evolving so rapidly, it's difficult to keep up to date on just what is out there at any one given time. We intend to use this space as an area to post newly discovered web sites that have a particular slant towards GIS and spatial data. Please direct any new URL's to the editor so they can be included in the next issue, as well as any that are obsolete or incorrect.

Check these out when you get a chance:

- www.gisdatadepot.com for free GIS data sets, including DOQ's and DRG's (Quads)
- http://mapping.usgs.gov/ for national mapping information from USGS.
- http://nsdi.usgs.gov/for information on the Geospatial Data Clearinghouse.
- http://terraserver.microsoft.com/ To see multidate aerial photo/satellite imagery over the USA
- www.nationalgeographic.com National Geographic Society's new webatlas: **MapMachine**

Year 2000
(or Why 2K?)

Are you as sick as I am of hearing about Y2K and all of its possible ramifications. I for one, can't wait we can get on with life again and no longer have to listen/read about all of the potential life(style) threatening computer crashes, etc. and can get back to all of the regular news about murders, social unrest that the media usually feeds us.

Richard Ferrazzuolo of Region 4's Information Management Branch comments:

"As of November 15, 1999, a complete inventory of non mission critical systems (applications) was completed in March 1998 and the Y2K vulnerability assessment of these non mission critical systems was finished by September 30, 1998. Since that date it has been determined that 70 of 82 systems are compliant. Of the 12 that are non-compliant, 2 have repair/replacement schedules, 7 have been retired, and 3 have not had final timetables established for compliance. One of the two systems with schedules will be retired and replaced with a Y2K compliant version by December 31, 1999. The other system is an EPA HQ system that is being revamped."

"Based on a statistical sampling of 168 of the 1400 PC's in Region 4, it has been determined that we have achieved 100% compliance of PC desktop hardware. In addition, 30 of the 31 servers currently online in Atlanta and Athens are compliant with 14 having been retired."

"The Athens lab has completed its inventory of laboratory and scientific equipment and of these, 124 of 129 are compliant, with 6 being retired. Buildings and facilities in Atlanta are GSA controlled while the buildings and facilities in Athens, which number 25, are all compliant."

DEPARTMENTS

CALENDAR

EPA Region 4 GIS Users Group
Date: 2nd Tuesday of the Month
Location: 9th Floor GIS Digitizing Rm.
Topic: Varies Monthly
Time: 10:00am-11:15am
Contact: taber.rock@epa.gov

Georgia URISA
Date: Monthly
Location: Atlanta Regional Comm. Bldg.
Topic: Varies Monthly
Time: 11:30am-1:30pm
Internet: www.urisa.org

OGETA Forum for Spatial Data
Date: Monthly
Location: Atlanta Regional Commission
Topic: Varies Monthly
Time: 10:00am - 12:00pm
Internet: www.ogeta.com

2nd International Conference on Geospatial Information in Agriculture & Forestry
Location: Lk. Buena Vista, FL, Jan. 10-12, 2000
Internet: www.erim-int.com/CONF/conf.html

ESRI Users Conference 2000
June 26-30, 2000, San Diego, CA
Internet: www.esri.com

URISA 2000 Annual Conference
August 19-23, 2000, Orlando, FL
Internet: www.urisa.org

GIS in EPA Region 4

The GIS Support Group for the Science and Ecosystem Support Division (SESD) Lab in Athens supports remedial investigations and ecological studies with GIS analyses and mapping.

Athens GIS Support Group, L-R: Don Norris, Trudy Stiber, Candace Stoughton, Donnie Williams.

Industry News

ESRI – Redlands, California

Free seminars -

Throughout October and November ESRI offered the first of a series of free worldwide seminars displaying the capabilities of ArcInfo 8. Additional cities will be visited in the first quarter of 2000. For more information on ArcInfo 8, as well as a complete list of seminar locations and dates, and to register for a seminar, visit www.esri.com/arcinfo8.

Training -

However for those who don't want to travel to a seminar or training site – You can register for free training modules that ESRI offers over the internet at their Virtual Campus at http://campus.esri.com/free/ .

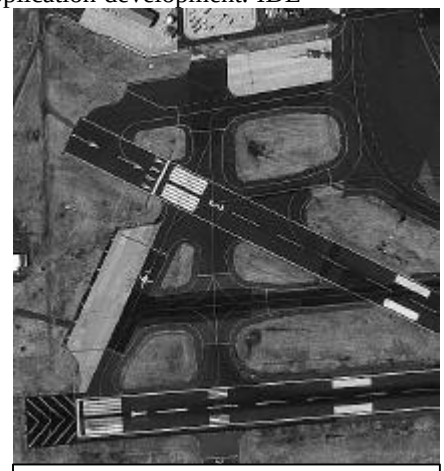
You can complete the module exercises, take an exam, and earn a Certificate of Completion in just a few hours. Begin by clicking "Go to Class" next to the module name or click on the module name for a detailed catalog description. Note: you will have to have the necessary software installed on your machine in order to complete the exercises.

Research Systems, Inc. --Boulder Colorado,

Training on IDL -

Research Systems, Inc., the creators of the ENVI (Environment for Visualizing Images) image analysis software and IDL, the Interactive Data Language, is offering a training class on Intermediate Programming and Analysis with IDL on January 25-28, 2000. The cost of the 4 day course is $1450.00 and is being held at the New Horizons training facility on 4053 LaVista Road, Atlanta. The deadline for registration is January 6th, 2000. For more information contact RSI at www.rsinc.com . For directions to the training facility go to: www.newhorizons.com/locations/site_detail.cfm/SiteID=2&searchfrom=locations

IDL, a 4GL language, is software for data analysis, visualization, and cross-platform application development. IDL combines all of the tools needed for any type of project — from "quick-look," interactive analysis and display to large-scale commercial programming projects.



Runways at Washington's National Airport

Space Imaging - Thornton, Colorado
IKONOS Launched!

The much anticipated (and touted) launch of a commercial 1-meter spatial resolution satellite finally became a reality on September 24th. Thornton, Co.-based Space Imaging's IKONOS was rocketed aloft by an Athena II booster from Vandenberg Air Force Base in California.

Seventy-two hours after a flawless launch, IKONOS began collecting its first high-resolution data. Some of the first scenes (of Richmond, VA and Washington, DC) are truly remarkable in their clarity and contrast. As an old photogrammetrist, I kept having to tell myself that I was looking at a satellite image collected image from 400 miles up and not a standard 9"x9" "low-level" aerial photo!

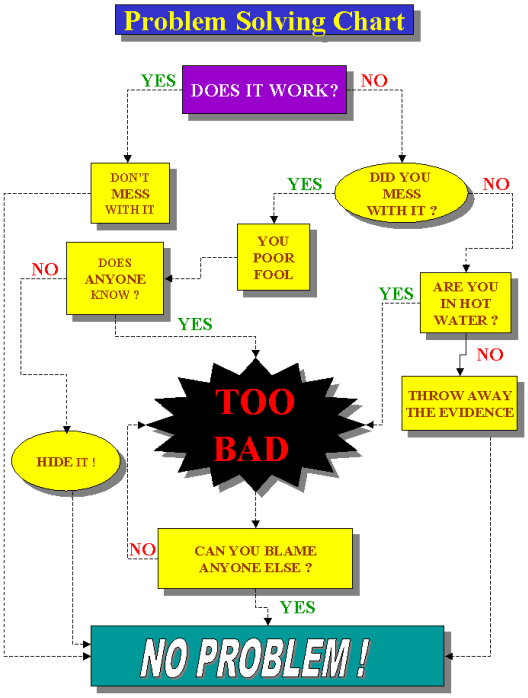
The 1600 lb. craft collects the 1-meter data as panchromatic (B/W) while simultaneously collecting multi-spectral data at 4-meters. Revisit frequency is approximately 1.5 to 2.9 days, depending on latitude of area of interest. For detailed specifications go to www.spaceimaging.com/aboutus/satellites/IKONOS/ikonos.html on the web. Products will be marketed through Space Imaging's CARTERRA catalog. Seeing is believing, so check out Space Imagings website at www.spaceimaging.com . The two other contenders in the high stakes/high-resolution satellite arena have some catching up to do. Longmont Co.-based EarthWatch (www.digitalglobe.com/) plans to launch its QuickBird 1-meter satellite in the first quarter of 2000 followed by Dulles, Virginia's Orbital Imaging Corp.'s OrbView 3 & 4 satellites scheduled for launch by mid to late 2000.

ERDAS IMAGINE® was used to process and display the first image collected by IKONOS. The image is a one-meter resolution black-and-white image of Washington, D.C. According to Lawrie E. Jordan, III, ERDAS' president: "This opens up an exciting new era of global, geographic imaging on the desktop,". "This truly is the dawn of the Earth information age." ERDAS IMAGINE software is integrated into Space Imaging's CARTERRA Analyst product, which combines geographic information systems (GIS), remote sensing, imagery analysis, photogrammetry and cartography tools into a single workstation. www.orbimage.com/ & www.erdas.com .

Staff News

Adios to a True Amigo!

The GRITS team and many others said goodbye to Jesse Dooley on December 9th at a farewell retirement luncheon given in his honor. Jesse will be retiring on December 31st after 28 years with EPA and 3 years with the GRITS team. Jesse's computer expertise as well as his humor and cheerfulness will be greatly missed, but we're sure that he'll be thinking of us every time he's on the fairway!



Wacked

1999 – GIS and Information Resources Section

U.S. Environmental Protection Agency, Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, Georgia 30303-8960
www.epa.gov/region4/index.html

Editor
Rock G. Taber II
(404) 562-8011
taber.rock@epa.gov

Associate Editors
Phyllis Mann
Mary Spivey
Dina Gramates (Contractor)
Cydrena Harris (Contractor)

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